

Name: _____
A2CC: Complex Numbers

Date: _____
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Do Now:

1. $625^{\frac{3}{4}}$

2. $(3ab^2c)\left(\frac{2a^2b}{c^3}\right)^{-1}$

3. Solve $x^2 + 1 = 0$

Definition: The imaginary unit, i , is defined as $\sqrt{-1}$. Therefore:

$i^0 =$	$i^4 =$
$i^1 =$	$i^5 =$
$i^2 =$	$i^6 =$
$i^3 =$	$i^7 =$

We can easily simplify any power of i . We do this by:

Examples:

Simplify each.

1. i^{20}

3. i^{78}

2. i^{19}

4. $3i^{11} \cdot 2i^5$

Property of negative square roots:

$$\sqrt{-c} = \sqrt{-1c} = \sqrt{-1}\sqrt{c} = i\sqrt{c}$$

Examples:

Simplify each.

5. $\sqrt{-25}$

6. $\sqrt{-32}$

7. $-\sqrt{25} - \sqrt{-147}$

8. $\sqrt{-128}$

9. $\sqrt{-9} + \sqrt{-16}$

Definition:

A number of the form $a + bi$, where a and b are real numbers and $i = \sqrt{-1}$ is called a **complex number**. a is called the **real part** and bi is called the **imaginary part**. A complex number written with the real part first and the imaginary part last is in **standard form**.

Examples:

Perform the operations and put your answers in standard form.

10. $(-1 + 2i) + (5 - 3i)$

11. $(-11 - 40i) - (2 + 10i)$

12. $10i(6 - 8i)$

13. $(2 + 5i)(3 - 15i)$

14. $\sqrt{-4} \cdot \sqrt{-10} \cdot \sqrt{36}$

15. $(5 - \sqrt{-27}) - (9 + \sqrt{-108})$

16. $(-2 + 6i)(3 - 2i)$

17. $(4 + i)(-5 - 3i)$

18. Simplify: $5i^{18} + 7i^{25} + 2i^{28} + 6i^{43}$

19. Determine the result in simplest $a + bi$ form:

$$(5 + 2i)(-3 + i) + 4i(2 + 3i)$$

Definition:

$a + bi$ and $a - bi$ are called **complex conjugates**. So, $(a + bi)(a - bi) = \underline{\hspace{2cm}}$